Unraveling turtle and tortoise species in Akagera National Park using an eco-genetic approach

Field Report
VW Summer school

CHELONIAN GROUP
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Introduction:

Sub-Saharan Africa harbours the highest diversity of tortoises, however the diversity of African chelonians is understated and their taxonomy is not resolved. Their taxonomy is almost exclusively based on morphology which often obscures evolutionary relationships (Branch, 2007). In recent years, several molecular studies have shown that the reptile fauna in southern Africa is more diverse than was previously believed (e.g., Ernst et al. 2000; Branch et al. 2007; Heideman et al. 2011). This is also true for freshwater turtles and tortoises (e.g., Petzold et al. 2014; Kindler et al. 2012, 2016; Vamberger et al. 2018, 2019). Molecular genetic evidence evolved as an extremely important tool to aide taxonomic and also conservation decisions (Spitzweg et al. 2019, 2020; Dajčman et al. 2021). Consequently, our purpose at the summer school was to have a first glance on the diversity and distributions of chelonians living in the Akagera National Park, Rwanda using an eco-genetic approach. Information on species diversity and their distributions represent the fundamental basis for any effective conservation management. This is of particular importance for species that may contain cryptic taxa, as our previous research indicated. In such instances, it is important to re-assess the distribution of each taxon and revise conservation assessments, because some cryptic taxa may be threatened.

Until today almost nothing is known about chelonians in Rwanda. Fischer & Hinkel (1992) reported only two Hinge-back Tortoise (*Kinixys* sp.) species and one Hinge-back terrapin (*Pelusios subniger*) species for the Akagera National Park. In 2018, Spawls et al. reported two Hinge-back Tortoise species (*Kinixys belliana, K. spekii*), three helmeted terrapin species (*Pelomedusa subrufa, P. neumanni and P. kobe*) and two Hinge-back terrapin species (*Pelusios rhodesianus, P. williamsi*) for Rwanda. All observations to date are based on morphological data, but we know that some taxa are hard to tell apart only by morphology e.g. *Pelomedusa*. *Pelusios*, *Kinixys* and an integrative taxonomic approach is mandatory.

Field methods:

Our fieldwork consists of collection of genetic samples, measurements, photographs, and GPS localities from native tortoises and terrapins. Processing involves: finding specimens, collecting measurement from both carapace and plastron using digital callipers and measuring tape, taking standardized photographs as photo-vouchers, collecting a sample, and individual marking of each specimen using a permanent marker. After processing, all live tortoise and terrapins have been released at the exact locality where captured.

Figure 1: Measuring and photographing terrapins in Akagera National Park. Photos M. Vamberger & R. Ernst.

Searches for tortoises were conducted during suitable weather conditions on foot as well as by car. Tortoises usually maintain a crepuscular daily activity being highest in the early morning (~6AM-9AM) and late afternoon (~4PM-7PM) depending on the weather conditions.

Terrapins have been hand captured (Figure 1) or caught using a dip net. In larger water bodies, funnel traps baited with canned sardines were used (Figure 2).

Figure 1: Temporary water bodies in which turtles can be found and “easily” hand captured. Photo Emmily Pauls.

Figure 2: Trapping using baited funnel traps. Photo Melita Vamberger.

Results:

In total we collected 45 blood/tissue samples from chelonians (8 *Kinixys spekii*, 35 *Pelomedusa* sp., 1 terrapin, 1 *Pelusios* sp.; see Figure 3). Some taxa are hard to tell apart only by morphology, therefor genetic analyses will be conducted in the Museum of Zoology, Senckenberg Natural History Collections Dresden. Detailed species distribution maps will be available after all laboratory procedures and analyses are finished.

Figure 3: Map of Akagera National Park with records of sampled chelonians: red dots – *Kinixys spekii*, blue dots – *Pelomedusa* sp., green dot – *Pelusios* sp, and white dots – traps.

IUCN Red List status of species which could be present in Akagera NP:

Kinixys spekii - Not Evaluated (NE); TFTSG Provisional Red List: Vulnerable (VU, assessed 2013); CITES: Appendix II, as Testudinidae spp.

Kinixys belliana - Not Evaluated (NE)

Pelomedusa subrufa - Not Evaluated (NE)

Pelomedusa neumanni - Not Evaluated (NE)

Pelomedusa kobe - Not Evaluated (NE)

Pelomedusa schweinfurthi - Not Evaluated (NE)

Pelusios castanoides – Least concern (LC)

Pelusios rhodesianus – Least concern (LC)

Pelusios subniger – Least concern (LC)

Pelusios sinuatus - Not Evaluated (NE)

Pelusios williamsi - Not Evaluated (NE)

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